

REMARKS

Following entry of the above amendments to the claims, claims 1-23 are pending in the present application. Claims 1, 2, 7, 10-12, 13 and 16 stand rejected. Claims 3-6, 8-9, 14-15, and 17-23 stand objected to.

Examiner's Objections and Applicants' Responses

1. Drawings

The Examiner objects to the drawings because empty diagram boxes are impermissible under 37 CFR §1.83(a).

The Examiner states that the empty diagram boxes 45, 36, 30, 23, in FIG. 2; 45, 36, 30, 29 in FIG. 3; 62, 23 in FIG. 4; 36, 20a in FIG 7; and 36, 20b in FIG. 8 of the drawings., must be labeled with an appropriate descriptive phrase in addition to the reference legend already present. Appropriate correction is required. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance

2 Applicant's Response to Examiner's Objections to the Drawings

In response to Examiner's requirement, applicants have provided replacements sheets 2/8, 3/8, 4/8, 7/8, and 8/8. These replacements sheets contain text labels in the diagram boxes of FIGS. 2-3, 4, and 7-8. All text labels are new, but do not add new matter.

The box in FIG. 2 that represents item 20 "formation pressure tester tool" in the application as filed, is too crowded and too small to accommodate the full title "FORMATION PRESSURE TESTER TOOL" with characters sufficiently large to satisfy PTO requirements for minimum character size. Accordingly, applicants have deleted detail from FIG. 2 and have represented the title of item 20 "formation pressure tester tool" in the diagram box by the acronym "FPTT". Items deleted from FIG. 2 are all illustrated in FIG. 3.

To maintain correspondence between FIGS. 2 and 3 and the written description, paragraphs 33 and 34 of the specification are amended herein above to introduce the acronym, and to refer the reader to FIG. 3, rather than FIG. 2, where the specification refers to item-numbered components that are no longer shown in FIG. 2, but are shown in FIG. 3.

3. Examiner's Objections to Claims 6, 15 and 23

Claims 6, 15, and 23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites the limitation "tool pressure" in lines 1 and 2 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim 15 recites the limitation "the electromechanical control means" in lines 2 and 3 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim 23 recites the limitation "said electromechanical control means" in line 1 of the claim. There is insufficient antecedent basis for this limitation in the claim.

4. Applicant's Response to Examiner's Objections to Claims 6, 15, and 23

Applicant has amended claim 6 to replace the phrase "tool pressure" by the phrase "cavity pressure", making claim 6 now consistent with parent claims 1, 2 and 3.

In response to the examiner's objection to claims 15 and 23, applicant has amended claim 12 to include "control means", thereby providing antecedent basis for this phrase in dependent claims 13, 14, 15, and 23.

In response to the Examiner's objection to claim 15, applicant has further amended claim 15 to replace the phrase "the electromechanical control means" by the phrase "an electromechanical assembly". The phrase "electromechanical assembly" finds support in the specification at paragraph 37 of the application as filed.

In response to the Examiner's objection to claim 23, applicant has amended claim 23 to replace "said electromechanical control means" by "said control means", thereby making claim 23 consistent with parent claim 12, which is currently amended to include "control means".

Applicant respectfully requests that the Examiner's objection to claims 6, 15, and 23 be withdrawn.

Examiner's Rejections and Applicants' Responses

5. Examiner's Rejection of Claims 1, 2, 12 and 16 under 35 U.S.C. 103(a)

The Examiner rejects claims 1, 2, 12 and 16 under 35 U.S.C. 103(a) as being unpatentable over Proett et al. (5644076) in view of Proett et al. (5703286).

As a prelude to discussing the Examiner's rejections of specific claims under 37 CFR 103(a), applicants note that the primary purpose of the probe in the prior art is to break the mud cake seal and draw formation fluid into the cavity defined by its piston, whereas one aspect of the invention, "holding constant the volume of the cavity immediately after detecting the occurrence of the break in the mud cake seal", prevents the probe from drawing formation fluid into the cavity, thereby running counter to the teaching of the prior art.

5.1 Examiner's Rejection of Claim 1 under 35 U.S.C. 103(a)

In rejecting claim 1, the Examiner states that Proett et al. disclose in the patent entitled "Wireline formation tester supercharge correction method" providing a tool defining a probe and a variable-volume pretest cavity fluid coupled to the probe pressing the probe into contact with the mud cake (218; Figure 2B); expanding the volume of the cavity in sufficient amount to produce a break in the mud cake seal during a draw-down period (Column 3). Proett et al. do not disclose holding constant the volume of the cavity immediately after detecting the occurrence of the break in the mud cake seal for a sufficient build-up period to establish pressure equilibrium between cavity fluid and formation fluid; measuring pressure in the cavity and setting formation fluid pressure equal to the

measured pressure. The Examiner further states that Proett et al. disclose in the patent entitled "Method of formation testing" holding constant the volume of the cavity immediately after detecting the occurrence of the break in the mud cake seal for a sufficient build-up period to establish pressure equilibrium between cavity fluid and formation fluid; measuring pressure in the cavity and setting formation fluid pressure equal to the measured pressure (Column 9, lines 1-10). Therefore, (the Examiner concludes) it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Proett et al. to include holding constant the volume of the cavity immediately after detecting the occurrence of the break in the mud cake seal for a sufficient build-up period to establish pressure equilibrium between cavity fluid and formation fluid; measuring pressure in the cavity and setting formation fluid pressure equal to the measured pressure. By adding this feature the apparatus would be able to accurately perform pressure tests on various formations.

5.2 Applicant's Argument Traversing Rejection of Claim 1 under 35 U.S.C. 103(a)

In rejecting claim 1, the Examiner notes that Proett et al. ('076) do not disclose the process of "holding constant the volume of the cavity immediately after detecting the occurrence of the break in the mud cake seal for a sufficient build-up period to establish pressure equilibrium between cavity fluid and formation fluid; measuring pressure in the cavity and setting formation fluid pressure equal to the measured pressure". The Examiner then asserts that Proett et al. ('286) do disclose this process at column 9, lines 1-10.

Applicants respectfully submit that Proett et al. ('286) do not disclose the process claimed in claim 1. In the full paragraph covering column 9, lines 1-10, (column 8, line 66 - column 9, line 10), Proett et al. merely state that

During the build-up phase, the reduced pressure in the tester 10 in the vicinity of the probe 34 continues to draw connate fluids or mud filtrate from the formation 28 into the tester 10 through the probe 34. As these fluids enter and fill the tester 10, the pressure detected by the sensor 50, as shown by the curve portion 106, rises to P_{bu} which approaches equilibrium with the formation pressure. This final buildup pressure P_{bu} is

frequently referred to as the "sandface pressure." It is usually assumed that the sandface pressure is close to the formation pressure. This equilibrium marks the close of the buildup phase of the test. When the formation tester 10 is disengaged from the borehole wall at t_{bu} , the detected formation pressure increases rapidly from P_{bu} , as shown by the curve portion 108, due to the removal of pressure applied by the isolation packer 36.

Applicants note that there is no mention in this paragraph of "detecting an occurrence of a break in the mud cake seal" or "holding constant the volume of the cavity immediately after detecting the occurrence of the break in the mud cake seal" as required in claim 1, as currently amended.

Furthermore, the immediate previous paragraph states

An exemplary drawdown phase of the formation test may proceed as follows. Formation fluid is drawn into the tester 10 by decreasing the pressure in the tester 10, as shown by the curve portion 104 beginning at t_{start} . The pressure is reduced by retracting the piston 66 within the cylinder 68, thus expanding the test chamber 54. When the pressure within the tester 10 has been sufficiently reduced to the drawdown pressure P_{dd} , the pretest piston is stopped 54 causing the buildup phase to begin.

This paragraph clearly indicates that the pretest piston is stopped only when "the pressure within the tester 10 has been sufficiently reduced to the drawdown pressure P_{dd} ". Thus, Proett et al. ('286) disclose neither "detecting an occurrence of a break in the mud cake seal" nor "holding constant the volume of the cavity immediately after detecting the occurrence of the break in the mud cake seal", as required in claim 1 as currently amended.

Reasons for "holding constant the volume of the cavity immediately after detecting the occurrence of the break in the mud cake seal" and the resulting benefits are detailed in paragraphs 29-31 of the present application. Applicants note that neither Proett et al. ('076) nor Proett et al. ('286) mention "holding constant the volume of the cavity immediately after detecting the occurrence of the break in the mud cake seal", nor do they disclose or suggest any reason for performing this step.

By teaching to stop the pretest piston only when “the pressure within the tester 10 has been sufficiently reduced to the drawdown pressure”, Proett et al. (‘286) teach against “holding constant the volume of the cavity immediately after detecting the occurrence of the break in the mud cake seal”.

Thus, neither Proett et al. (‘076) nor Proett et al. (‘286) disclose or suggest “detecting an occurrence of a break in the mud cake seal” or “holding constant the volume of the cavity immediately after detecting the occurrence of the break in the mud cake seal”. Claim limitations cannot be ignored. Furthermore, teaching away from the claimed invention is a *per se* demonstration of lack of *prima facie* obviousness.

Applicants respectfully request that the Examiner’s rejection of claim 1 under 35 U.S.C. 103(a), be withdrawn.

5.3 Examiner’s Rejection of Claim 2 under 35 U.S.C. 103(a)

In rejecting claim 2, the Examiner states that Proett et al. disclose where detecting the break in the mud cake seal includes measuring cavity pressure and detecting an abrupt change associated with cavity pressure (Column 2, lines 46-60).

5.4 Applicant’s Argument Traversing Rejection of Claim 2 under 35 U.S.C. 103(a)

Applicants accept that Proett et al. (‘076) disclose where detecting the break in the mud cake seal includes measuring cavity pressure and detecting an abrupt change associated with cavity pressure. However, Proett et al. (‘076) do not use “detecting the break in the mud cake seal” to initiate anything. Specifically they do not use “detecting an occurrence of a break in the mud cake seal” to initiate the steps of “holding constant the volume of the cavity immediately after detecting the occurrence of the break in the mud cake seal, for a sufficient build-up period to establish pressure equilibrium between cavity fluid and formation fluid; measuring pressure in the cavity; and setting formation fluid pressure equal to measured pressure”, as required by claim 1. Claim 2 is dependent on claim 1, and claim 2 should be passed to allowance if claim 1 is allowed.

Applicants respectfully request that the Examiner's rejection of claim 2 under 35 U.S.C. 103(a), be withdrawn, and that when claim 1 is allowed, claim 2 be allowed as being dependent on allowed claim 1.

5.5 Examiner's Rejection of Claim 12 under 35 U.S.C. 103(a)

In rejecting claim 12, the Examiner states that Proett, et al. disclose an elongated body adapted for downhole operation; a probe, extendable from the elongated body, the probe defining an inflow aperture; a pretest piston pump defining a variable-volume pretest cavity coupled to the inflow aperture: a) means for expanding the-volume of the pretest cavity in sufficient amount to produce a break in the mud cake seal and b) means for detecting an occurrence of a break in the mud cake seal (Column 3, Figure 2B). The Examiner admits that Proett et al. do not disclose a means for holding constant the volume of the cavity immediately after detecting the occurrence of the break-in-the mud cake seal for a sufficient build-up period to establish pressure equilibrium between pretest cavity fluid and-formation fluid and a pressure sensor coupled to measure pressure in the pretest cavity, but asserts that Proett et al. disclose a means for holding constant the volume of the cavity immediately after detecting the occurrence of the break-in-the mud cake seal for a sufficient build-up period to establish pressure equilibrium between pretest cavity fluid and-formation fluid and a pressure sensor coupled to measure pressure in the pretest cavity (Column 9, lines 1-10). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Proett et al. to include a means for holding constant the volume of the cavity immediately after detecting the occurrence of the break-in-the mud cake seal for a sufficient build-up period to establish pressure equilibrium between pretest cavity fluid and-formation fluid and a pressure sensor coupled to measure pressure in the pretest cavity. By adding this feature the apparatus would be able to accurately perform pressure tests on various formations.

5.6 Applicant's Argument Traversing Rejection of Claim 12 under 35 U.S.C. 103(a)

In rejecting claim 12, the Examiner asserts that Proett et al. disclose a means for holding constant the volume of the cavity immediately after detecting the occurrence of the break-in-the mud cake seal for a sufficient build-up period to establish pressure equilibrium between pretest cavity fluid and-formation fluid and a pressure sensor coupled to measure pressure in the pretest cavity (Column 9, lines 1-10).

While applicants accept that Proett et al. disclose hardware that is capable of being used as described by the Examiner, applicants note that Proett et al. do not disclose or suggest “control means, including

- a) means for expanding the volume of the pretest cavity in sufficient amount to produce a break in the mud cake seal,
- b) means for detecting an occurrence of a break in the mud cake seal, and
- c) means for holding constant the volume of the cavity immediately after detecting the occurrence of the break in the mud cake seal, for a sufficient build-up period to establish pressure equilibrium between pretest cavity fluid and formation fluid”,

as required by claim 12.

There is no suggestion in the Proett et al. to include such control means. As noted above, Proett et al. ('286), at column 8, lines 62-64, teach means for “stopping the pretest piston” when “the pressure within the tester 10 has been sufficiently reduced to the drawdown pressure P_{dd} ”. This teaches away from the claimed invention of “means for holding constant the volume of the cavity immediately after detecting the occurrence of the break in the mud cake seal” (emphasis added). Teaching away from the claimed invention is a *per se* demonstration of lack of *prima facie* obviousness.

Applicants respectfully request that the Examiner's rejection of claim 12 under 35 U.S.C. 103(a), be withdrawn.

5.7 Examiner's Rejection of Claim 16 under 35 U.S.C. 103(a)

In rejecting claim 16, the Examiner states that Proett et al. disclose where the tool includes a constant volume flow line (Figure 2B).

5.8 Applicant's Argument for Allowance of Claim 16

Applicants respectfully request that when claim 12 is allowed, claim 16 be allowed as being dependent on allowed claim 12.

6 Examiner's Rejection of Claims 7, 10 and 11 under 35 U.S.C. 103(a)

Claims 7, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Proett et al. (5644076) in view of Proett et al. (5703286) and in further view of Desbrandes.

6.1 Examiner's Rejection of Claim 7 under 35 U.S.C. 103(a)

In rejecting claim 7, the Examiner states that Proett et al. do not disclose where detecting the break in the mud cake seal includes detecting a difference between a measured cavity pressure and a corresponding cavity pressure from a reference cavity pressure profile. However, Desbrandes discloses in the publication "Wireline Formation Testing, a new extended drawdown technique" where detecting the break in the mud cake seal includes detecting a difference between a measured cavity pressure and a corresponding cavity pressure from a reference cavity pressure profile (Page 41). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Proett et al. to include where detecting the break in the mud cake seal includes detecting a difference between a measured cavity pressure and a corresponding cavity pressure from a reference cavity pressure profile. By adding this feature the apparatus would be able to properly obtain a formation and permeability reading.

6.2 Applicant's Argument Traversing Rejection of Claim 7 under 35 U.S.C. 103(a)

Applicants note that claim 7 requires “detecting an occurrence of a break in the mud cake seal” by “detecting a difference between a measured cavity pressure and a corresponding cavity pressure from a reference cavity pressure profile”, as part of a method for determining formation fluid pressure in earth formation surrounding a borehole. Applicants further note that the Desbrandes reference is not directed to, nor does it disclose or suggest “detecting an occurrence of a break in the mud cake seal” as part of a method for determining formation fluid pressure in earth formation surrounding a borehole. The Desbrandes reference, as disclosed in pages 41 and 42 is directed to determining mud cake permeability (see equation 3 on page 42) and other parameters. Formation fluid pressure is not measured as in the present invention, but is calculated from a known sandface pressure. See text on page 42, just above equation 3. Therefore, the Desbrandes reference does not disclose or suggest “a method for determining formation fluid pressure in earth formation surrounding a borehole, the method comprising: detecting an occurrence of a break in the mud cake seal, wherein detecting an occurrence of a break in the mud cake seal includes detecting a difference between a measured cavity pressure and a corresponding cavity pressure from a reference cavity pressure profile”, as required by claim 7.

Applicants respectfully request that the Examiner's rejection of claim 7 under 35 U.S.C. 103(a), be withdrawn.

6.3 Examiner's Rejection of Claim 10 under 35 U.S.C. 103(a)

In rejecting claim 10, the Examiner states that Proett et al. do not disclose where the predetermined constant rate is within the range of 3-160cc/minute. However, Desbrandes et al. disclose in the publication "A new concept in wireline formation testing extended drawdown" where the predetermined constant rate is within the range of 3-160cc/mhmte (Page 4, paragraph 1).

Therefore, it would have been obvious tone of ordinary skill in the art at the time the invention was made to modify Proett et al. to include where the predetermined constant rate is within the range of 3-160cc/minute. By adding this feature the apparatus would be able to measure permeability accurately since the constant rate would be within a particular range.

6.4 Applicant's Argument for Allowance of Claim 10

Applicants respectfully request that when claim 9 is allowed, claim 10 be allowed as being dependent on allowed claim 9.

6.5 Examiner's Rejection of Claim 11 under 35 U.S.C. 103(a)

In rejecting claim 11, the Examiner states that Proett et al. do not disclose where the predetermined constant rate is approximately 5cc/minute. However, Desbrandes et al. disclose where the predetermined constant rate is within the range of 3-180cc/mhmt (Page 4, paragraph 1). Therefore, it would have been obvious tone of ordinary skill in the art at the time the invention was made to modify Proett et al. to include where the predetermined constant rate is within the range of 3-160cc/minute. By adding this feature the apparatus would be able to measure permeability accurately since the constant rate would be within a particular range.

6.6 Applicant's Argument for Allowance of Claim 11

Applicants respectfully request that when claim 10 is allowed, claim 11 be allowed as being dependent on allowed claim 10.

7. Examiner's Rejection of Claim 13 under 35 U.S.C. 103(a)

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Proett et al. (5644076) in view of Proett et al. (5703286) and in further view of Proett et al.

In rejecting claim 13, the Examiner states that Proett et al. do not disclose where the control means includes an electromechanically driven roller screw planetary system. The Examiner further states that Proett et al. disclose in the publication "Supercharge Pressure Compensation with New Wireline Formation Testing Method" where the control means includes an electromechanically driven roller screw planetary system (Page 3, column 1, lines 13). The Examiner then concludes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Proett et al. to include where the control means includes an electromechanically driven roller screw planetary system, and that by adding this feature the apparatus would be able to take multiple tests during a single pad test.

8. Applicant's Argument Traversing Rejection of Claim 13 under 35 U.S.C. 103(a)

Applicants note that Proett et al., in the cited publication "Supercharge Pressure Compensation with New Wireline Formation Testing Method" do not disclose control means including "an electromechanically driven roller screw planetary system". In the cited paragraph there is no mention of "an electromechanically driven roller screw planetary system". The paragraph at page 3, column 1, line 13, refers only to a "ball screw mechanism" and speaks only of "hydraulically sequenced" drive (at page 3, column 1, line 20). Therefore, Proett et al. do not disclose or suggest, in the patents or in cited publication control means including "an electromechanically driven roller screw planetary system".

Applicants respectfully request that the Examiner's rejection of claim 13 under 35 U.S.C. 103(a), be withdrawn.

9 Examiner's Further Objections to the Claims

9.1 Examiner's Objections to Claims 3-5, 8, 9, 14 and 17-22

Claims 3-5, 8, 9, 14 and 17-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9.2 Applicant's Response to Examiner's Objections to Claims 3-5, 8, 9, 14 and 17-22

Applicants have currently amended claims 1, 2, and 12, and these claims are now believed to be in condition for allowance. Each of claims 1, 2, and 12 is base claim or intervening claim to one or more of claims 3-5, 8, 9, 14 and 17-22. Accordingly, claims 3-5, 8, 9, 14 and 17-22 are believed to be in condition for allowance in their dependent form.

10. Examiner's Objections to Claims 6, 15, and 23

Claims 6, 15, 23 would be allowable if rewritten to overcome the rejections under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

11. Applicant's Response to Examiners Objections to Claims 6, 15, and 23

Applicants have currently amended claims 1, 2, 6, 12, 15, and 23, and these claims are now believed to be in condition for allowance. Each of claims 1, 2, and 12 is base claim or intervening claim to one or more of claims 6, 15 and 23. Accordingly, claims 6, 15 and 23 are believed to be in condition for allowance in their dependent form.

SUMMARY

Following entry of the amendments above to the claims, the specification and the drawings, it is believed that the application is now in condition for allowance.

Consideration of the application and issuance of a notice of allowance is respectfully requested. It is believed that no extension of time is required. If additional fees are required for the timely consideration of this application, please charge deposit account no. 120914.

Respectfully submitted,



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